



**International University of Africa,
Deanship of Postgraduate Studies,
Faculty of Education,
Department of Educational Technology**

**DESIGN AND IMPLEMENTATION OF INFORMATION
PROCESSING MODEL OF SCIENCE AND TECHNOLOGY
EDUCATION AND ITS IMPACT ON STUDENTS'
PERFORMANCE IN BIOLOGY**

(Senior Secondary Schools II Adamawa State, Nigeria)

A Thesis for the Degree of PhD

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى:

﴿ إِن فِي خَلْقِ السَّمَوَاتِ وَالْأَرْضِ وَالاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ لآيَاتٍ لِّأُولِي الْأَلْبَابِ، الَّذِينَ
يُذَكِّرُونَ اللَّهَ قِيَامًا وَقَعُودًا وَعَلَىٰ جُنُوبِهِمْ وَيَتَفَكَّرُونَ فِي خَلْقِ السَّمَوَاتِ وَالْأَرْضِ رَبَّنَا مَا خَلَقْتَ

هَذَا بَاطِلًا سُبْحَانَكَ وَقَنَا عَذَابُكَ ﴾

سورة آل عمران: 190-191

DECLARATION

I hereby declare that this thesis was written by me and it is a record of my own research work. It has not been presented before in any previous application for a higher degree. All references cited have been duly acknowledged.

NAME_____

DATE_____

APPROVAL PAGE

This thesis entitled “Design and Implementation of Information Processing Model of Science and Technology Education and its Impact on Students’ Performance in Biology” meets the regulations governing the award of PhD Degree of the International University of Africa, Khartoum and it is approved for its contribution to knowledge and literary presentation.

Supervisor

Date

External Examiner

Date

Internal Examiner

Date

DEDICATION

**This work is dedicated to those who have the greatest impact in my life:
my beloved Prophet Muhammad (SAW), my parents (Late Alh. Ahmad
wazirin Hashidu and Habiba).**

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All praise are due to Allah. We praise Him, seek His help and His ask forgiveness. We seek refuge in Allah from the evil of our souls and the adverse consequences of our deeds. Whoever Allah guides there is none that can misguides him.

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ABSTRACT

The study concerns with design and implementation of information processing models of science and technology education in biology and its impact on secondary school students' academic achievement in biology in Adamawa state. Four models out of the seven information processing models were designed and implemented. Five objectives were set, five research questions and five hypotheses tested at 0.05 level of significance guided the study. The experimental design of the study was quasi-experimental pretest posttest non-equivalent control group design which involved 280 SSII students from five purposively selected senior secondary schools in Adamawa state. Instrument used for data collection was cognitive test tagged Biology Cognitive Test (BCT) adapted from WAEC past questions from 2010-2015. The instrument was content validated by three experts. The instrument was also tested for reliability, using split half method. The reliability coefficient of 0.78 was obtained. The treatment lasted for eight weeks. The data collected were analyzed using descriptive statistics for the research questions, t-test and Multivariate Analysis of Covariance (MANCOVA) for the hypotheses. The result revealed that, information processing models enhanced students' performance in biology. Furthermore, post-hoc analysis revealed that, biological science inquiry model group performed better than the remaining models and lecture method group. Recommendations made based on the findings are, information processing models should be incorporated in the teaching of biology in secondary schools, Adamawa state government and schools should organize workshops for practicing teachers to inculcate skills of information processing models.

مستخلص

تناولت الدراسة تصميم وتنفيذ نماذج معالجة المعلومات لتعليم العلوم والتكنولوجيا في علم الأحياء وتأثيرها على التحصيل الدراسي لطلاب المدارس الثانوية في علم الأحياء بولاية أداماوا . ثم تصميم وتنفيذ أربعة نماذج من نماذج معالجة المعلومات السبعة، ثم وضع خمسة أهداف ، وخمسة أسئلة بحث وخمس فرضيات ثم اختبارها في مستوى 0.05 من الأهمية التي استرشدت بها الدراسة، كان التصميم التجريبي للدراسة هو الاختباري التجريبي غير المكافئ الذي اشتمل على 280 طالبا للصف الثاني الثانوي من خمس مدارس ثانوية منتقاة بشكل مقصود في ولاية أداماوا . وقد كانت الأداة المستخدمة لجمع البيانات هي الاختبار المعرفي المسمى اختبار البيولوجيا الإدراكية (BCT) المأخوذ من أسئلة امتحانات (WAEC) للسنوات الماضية ما بين 2010-2015م، وكذلك تمت مراجعة الاختبار من قبل الخبراء في المجال ، ثم التحقق من صحة هذا الأداة أيضا من أجل الموثوقية باستخدام طريقة تقسيم النصف ، ثم الحصول على معامل الموثوقية 0.78. استمرت التجربة لمدة ثمانية أسابيع ، ثم تحليل البيانات التي تم جمعها باستخدام الإحصاء الوصفي لأسئلة البحث من التباين (MANCOVA) للفرضيات . وكشف النتيجة أن نماذج معالجة المعلومات عززت أداء الطلاب في علم الأحياء . علاوة على ذلك كشف التحليل اللاحق أن مجموعة نموذج البحث العلمي في البيولوجيا كان أداؤها أفضل من النماذج المتبقية ومجموعة أساليب المحاضرات . وكانت التوصيات المقدمة بناء على النتائج هي: يجب أن تدرج نماذج معالجة المعلومات في تدريس علم الأحياء في المدارس الثانوية ، يجب على حكومة ولاية أداماوا والمدارس تنظيم ورش عمل للمدرسين الممارسين لغرس مهارات نماذج معالجة المعلومات .

Table of Content

Preliminary Pages

i.	Title page	I
ii.	Ayat of the Quran as theme of the study	ii
iii.	Declaration	iii
iv.	Dedication	iv
v.	Approval page	v
vi.	Acknowledgement	vi
vii.	Abstract	vii
viii.	Abstract in Arabic	viii
ix.	Table of content	ix
x.	List of Appendices	x

CHAPTER ONE: BASICS OF THE RESEARCH

i.	Introduction. -----	1
ii.	Statement of the problem. -----	3
iii.	Significance of the Study. -----	4
iv.	Research Objectives. -----	5
v.	Research Questions. -----	5
vi.	Research Hypotheses. -----	6
vii.	Research Methodology -----	7
viii.	Limitations of the Research. -----	7
ix.	Definition of Terms. -----	7
x.	Research Tool -----	7

CHAPTER TWO: THEORETICAL FRAMEWORK

i.	Introduction to Educational Technology -----	10
ii.	Theories of Intellectual Development Relevant to the Study. ----	12
iii.	Model of Information Processing Learning Theory. -----	30

iv.	Ausubel's Advance Organizer Learning Theory. -----	36
v.	Gagne' Instructional Design Theory -----	39
vi.	Introduction of Models in Science and Technology Education. --	42
vii.	Classification of Models of Science and Technology Education --	46
viii.	Concept of Information Processing Models of teaching. -----	60
ix.	Design of Advance Organizer Model. -----	65
x.	Design of Concept Attainment Model. -----	85
xi.	Design of Biological Science Inquiry Model. -----	96
xii.	Design of Taba Inductive Thinking Model. -----	106

CHAPTER THREE: REVIEW OF PREVIOUS STUDIES

i.	Empirical Literature on Advance Organizer Model. -----	112
ii.	Empirical Literature on Concept Attainment Model. -----	126
iii.	Empirical Literature on Biological Science Inquiry Model.-----	138
iv.	Empirical Literature on Taba Inductive Thinking Model. -----	142
v.	Analysis of Literature Review and Uniqueness of the Study. ----	149

CHAPTER FOUR: FIELD RESEARCH PROCEDURES

i.	Research Design. -----	153
ii.	Area of the Study. -----	155
iii.	Population of the Study. -----	155
iv.	Sample and Sampling Technique. -----	156
v.	Tool for data Collection. -----	156
vi.	Validity of the Tool. -----	157
vii.	Reliability of the Tool. -----	157
viii.	Implementation Procedure. -----	158
ix.	Control of Extraneous Variables. -----	160
x.	Method of data Analysis. -----	162

CHAPTER FIVE: ANALYSIS OF DATA AND INFORMATION

i.	Answering Research Questions. -----	164
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ii.	Hypotheses Testing. -----	174
iii.	Discussion of the findings. -----	182

CHAPTER SIX: FINDINGS, RECOMMENDATIONS AND SUGGESTIONS

i.	Findings of the Research. -----	191
ii.	Recommendations. -----	191
iii.	Suggestion for Further Studies. -----	192
	List of References -----	193

List of Appendices

1. **Appendix i:** Demographic Data of the Sample Students
2. **Appendix ii:** Test Blue Print
3. **Appendix iii:** Biology Students Achievement Test (BSAT)
Instrument for Pretest and Posttest.....
4. **Appendix iv:** Biology Student Achievement Test (BSAT)
Answers
5. **Appendix v:** Evidence of SPSS version 22, analysis.....